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Claims

1. Method of generating a mixed media stream from input
5 media streams having payload data elements and related
identifiers, comprising the step:
 - aligning the input media streams according to a
pre-specified relation between identifiers in
10 different input media streams before generating
the mixed media stream.
2. Method according to claim 1, *characterized in that* the
pre-specified relation between identifiers in
15 different input media streams is matched to a relation
between identifiers in further input media streams
used during generation of a further mixed media
stream.
- 20 3. Method according to claim 2, *characterized in that* the
matching of relations between identifiers in the input
media streams and in the further input media streams
is achieved by
 - 25 - identifying an intersection between the input
media streams and the further input media
streams,
 - determining a relation between identifiers in the
30 further input media streams for those further
input media streams which are comprised in the

intersection,

- aligning the input media streams which are comprised in the intersection according to the relation of identifiers in the further input media streams.

4. Method according to claim 3, *characterized in that* the input media streams at a point in time are described by $I_S = [(q_1, n_1), (q_2, n_2), \dots, (q_s, n_s)]$ with $\{q_1, q_2, \dots, q_s\}$ as set of input media streams and $\{n_1, n_2, \dots, n_s\}$ as set of identifiers in the input media streams at a point in time,

the further input media streams at a point in time are described by $I_M = [(s_1, i_1), (s_2, i_2), \dots, (s_m, i_m)]$ with $\{s_1, s_2, \dots, s_m\}$ as set of further input media streams and $\{i_1, i_2, \dots, i_m\}$ as set of identifiers in the further input media streams at the point in time,

the intersection between the input media streams and the further input media streams is

$$S_A = \{s_1, s_2, \dots, s_m\} \cap \{q_1, q_2, \dots, q_s\}, \text{ and}$$

the relation between identifiers in the further input media streams for those further input media streams which are comprised in the intersection is determined on the basis of $I_S' = \bigcup_{j \in \{1, \dots, s\}} \{(q_j, n_j) \mid q_j \in S_A\}$.

5. Method according to claim 4, *characterized in that* it further comprises a step of re-ordering the sequence of input media streams in the intersection according

to the sequence of further input media streams in the intersection.

6. Method according to claim 5, *characterized in that* the re-ordering of the sequence of input media streams is achieved according to a permutation vector defined by $\forall_{i \in [1, \dots, |I_s'|]} \{p(i) = j \in [1, \dots, |I_s'|] | s_i = q_j\}$.

7. Method according to one of the claims 3 to 6, *characterized in that* the alignment of input media streams in the intersection is achieved by

- determining a time delay for each input media stream such that relations between different identifiers in the input media streams after time delay correspond to relations between identifiers in the further input media streams, and
- shifting each input media stream in time according to the related time delay.

8. Method according to claim 7, *characterized in that* the time delay for each input media stream is determined according to

$$\delta_i = i_i - n_{p(i)}, i = 1, \dots, |I_s'|$$

$$\delta_i' = \delta_i - \max_{j \in [1, \dots, |I_s'|]} \delta_j, i = 1, \dots, |I_s'|$$

and each input media stream is shifted in time according to

$$q_{s_i}'(t) = q_{s_i}(t + \delta_i'), i = 1, \dots, |I_s'|.$$

9. Method according to one of the claims 1 to 8,
5 *characterized in that* an exchange of information regarding the pre-specified relation between identifiers is achieved through a signal transfer or a shared-memory mechanism.
10. Apparatus for generating a mixed media stream from
.0 input media streams having payload data elements and related identifiers, comprising:
- an alignment unit (22) adapted to align the input
.5 media streams according to a pre-specified relation between identifiers in different input media streams before generating the mixed media stream.
- 20 11. Apparatus according to claim 10, *characterized in that* it comprises an identifier interface unit (20) for exchange of the pre-specified relation between identifiers in different input media streams.
- 25 12. Apparatus according to claim 10 or 11, *characterized in that* the pre-specified relation is matched to a relation between identifiers in further input media streams used during generation of a further mixed media stream and that the matching of relations
30 between identifiers in the input media streams and in the further input media streams is achieved by

- a pre-processing unit (28) adapted to identify an intersection between the input media streams and the further input media streams,

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- a calculation unit (30) adapted to determine a relation between identifiers in the further input media streams for those further input media streams which are comprised in the intersection, and

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- the aligning unit (32) adapted to align the input media streams which are comprised in the intersection according to the relation of identifiers in the further input media streams.

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13. Apparatus according to claim 12, *characterized in that*

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the input media streams at a point in time are described by $I_s = [(q_1, n_1), (q_2, n_2), \dots, (q_s, n_s)]$ with $\{q_1, q_2, \dots, q_m\}$ as set of input media streams and $\{n_1, n_2, \dots, n_s\}$ as set of identifiers in the input media streams at a point in time,

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the further input media streams at a point in time are described by $I_M = [(s_1, i_1), (s_2, i_2), \dots, (s_m, i_m)]$ with $\{s_1, s_2, \dots, s_m\}$ as set of further input media streams and $\{i_1, i_2, \dots, i_m\}$ as set of identifiers in the further input media streams at the point in time,

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the pre-processing unit (28) is adapted to determine the intersection between the input media streams and the further input media streams according to

$$S_A = \{s_1, s_2, \dots, s_m\} \cap \{q_1, q_2, \dots, q_s\}, \text{ and}$$

the pre-processing unit (28) is further adapted to determine the relation between identifiers in the further input media streams for those further input media streams which are comprised in the intersection on the basis of $I_s' = \bigcup_{j \in \{1, \dots, s\}} \{(q_j, n_j) | q_j \in S_A\}$.

14. Apparatus according to claim 12 or 13, *characterized in that* the pre-processing unit (28) is further adapted to re-order the sequence of input media streams in the intersection according to the sequence of further input media streams in the intersection.

15. Apparatus according to claim 14, *characterized in that* the pre-processing unit (28) is adapted to re-order the sequence of input media streams according to a permutation vector defined by

$$\forall_{i \in \{1, \dots, |I_s'| \}} \{p(i) = j \in [1, \dots, |I_s'|] | s_i = q_j\}.$$

16. Apparatus according to one of the claims 12 to 15, *characterized in that* the alignment of input media streams in the intersection is achieved by

- the calculation unit (30) adapted to determine a time delay for each input media stream such that

relations between different identifiers in the input media streams after time delay correspond to relations between identifiers in the further input media streams, and

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- a shifting unit (32) adapted to shift each input media stream in time according to the related time delay.

10 17. Apparatus according to claim 16, *characterized in that* the calculation unit (30) is adapted to calculate the time delay for each input media stream according to

$$\delta_i = i_i - n_{p(i)}, i = 1, \dots, |I_s'|$$

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$$\delta_i' = \delta_i - \max_{j \in [1, \dots, |I_s'|]} \delta_j, i = 1, \dots, |I_s'|$$

and the shifting unit (32) is adapted to shift each input media stream in time according to

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$$q_{s_i}'(t) = q_{s_i}(t + \delta_i'), i = 1, \dots, |I_s'|.$$

18. Apparatus according to one of the claims 11 to 17, *characterized in that* it comprises an identifier unit (26) adapted to identify a relation between identifiers in different input media streams at a point in time and that the identifier interface (26) is adapted to forward at least two identifiers in the input media streams to a further apparatus for generating a mixed media stream for use during generation of the further mixed media stream.

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19. A computer program product directly loadable into the internal memory of a mixer unit comprising software code portions for performing the steps of one of the claims 1 to 9 when the product is run on a processor of the mixer unit.